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ABSTRACT

"Small Schools and Savings" rebuts the presumption that capital costs of school planning and construction render small schools uncompetitively expensive. Specific options are outlined that can help small schools be cost effective. The false logic of borrowing economies-of-scale arguments from the factory model and applying them to building schools is contradicted through an investigation that shows countervailing economies in a flexible, adaptive approach to school planning, siting, and organization. Specific potential savings opportunities that are advocated center on (1) the use of smaller sites; (2) renovation of an existing abandoned or underused building; (3) collaboration with other public agencies to incorporate smaller schools in multiuse facilities; and (4) integration with private or public sector construction or renovation projects or negotiation to include a school in construction or renovation of low-rise housing. It is unnecessary and inconsistent with new insights about urban education to continue building new, too-large buildings dedicated to schools. Two appendixes consider school size and achievement and findings from a Chicago (Illinois) study, and a third contains a 72-item bibliography. (SLD)

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Small Schools and Savings: Affordable New Construction, Renovation and Remodeling

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A REPORT OF THE PUBLIC EDUCATION ASSOCIATION

December 1992

REPORTS OF THE PUBLIC EDUCATION ASSOCIATION

1981 - 1992

* Advocacy and Architecture, by Jeanne Frankl in New Schools for New York: Plans and Precedents for Small Schools. Architectural League of New York and Public Education Association (Princeton Architectural Press, 1992).

* Small Schools' Operating Costs: Reversing Assumptions About Economies of Scale, by Susan E. Heinbuch, Ph.D. and Jeanne Frankl, edited by Alice Smith Duncan. December, 1992.

* Small Schools and Savings: Affordable New Construction, Renovation and Remodeling, researched by Diane Dolinsky under the direction of Jeanne Silver Frankl, edited by Alice Smith Duncan and Monte Davis. December, 1992.

Common Agendas: Collective Bargaining Between School Districts and Teacher Unions. A Work in Progress, by Jeanne Frankl and Kym Vanderbilt. October, 1991.

Hidden Costs: Teacher Absence in the NYC Public Schools, by Barbara Falsey, Ph.D., October, 1991.

Effective Elementary Schools, by Eileen Foley, Ph.D. 1991.

* Restructuring Neighborhood High Schools: The House Plan Solution, by Diana Oxley, Ph.D., Project Director, and Joan Griffin McCabe. June, 1990.

* Making Big High Schools Smaller, by Joan Griffin McCabe and Diana Oxley, Ph.D. January, 1989.

* Description of Middle School Initiatives in Four Districts for the Middle School Task Force Recommendations Advocacy Project, by Charol Shakeshaft, Ph.D. July, 1989.

* Effective Dropout Prevention: The Case for Schoolwide Reform, by Diana Oxley, Ph.D. 1988.

The Moderation of Stress in the Lives of the Students of an Urban Intermediate School: A Project to Coordinate Research and Environmental Intervention. Final Report of the Project on Academic Striving, by Joseph C. Grannis, Ph.D., Project Director, Mary Ellen Fahs, Ph.D, with Wanda L. Bethea, M.Ed. May, 1988.

Governing New York City Schools: Roles and Responsibilities in the Decentralized System, A Report of the Board of Trustees of the Public Education Association, by Nancy M. Lederman, Jeanne S. Frankl, and Judith Baum. February, 1987.

Special Education Reform: Prepare All Teachers to Meet Diverse Needs, by Constancia Warren, Ph.D. May, 1987.

* INDICATES TITLE RELATED TO SMALL SCHOOLS

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SMALL SCHOOLS and SAVINGS:

Affordable New Construction, Renovation and Remodeling

A Report of the Public Education Association

Researched by Diane Dolinsky
under the direction of Jeanne Silver Frankl

edited by Alice Smith Duncan with Monte Davis

Funded by a grant from the Exxon Education Foundation

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SMALL SCHOOLS AND SAVINGS

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"Small Schools and Savings" -- EXECUTIVE SUMMARY

The Public Education Association seeks a schools construction policy for New York City that is consonant with educational good sense and societal needs. Educational research demonstrates that children, and especially those in disadvantaged school districts, learn better in small schools. Yet in urban settings, small schools are rarely built.

Led by the new, legislatively created School Construction Authority (SCA), New York City's current school building program is slated to complete some 35 new public schools in this decade. Yet the multi-billion dollar five-year Capital Plan now in effect (1990-94) shows cost projections for site acquisition, design and construction -- related directly to size and capacity of the schools -- at levels that strike us as both high and arbitrary. SCA "large strategy" prototype designs, for 1200 to 2500 pupils, are estimated at a cost of $244 per square foot; a 900-seat SCA school design is estimated at from $27.1 to $30.55 million.

Based on consultations with experts in construction, urban planning, politics, education, real estate appraisal and related fields, "Small Schools and Savings" rebuts the presumption that capital costs of school planning and construction render small schools uncompetitively expensive. "Small Schools and Savings" points to specific options that can help small schools be created cost effectively; it shows how, at least for a school as small as 400-500 seats (a size excellently suited to early childhood, elementary, and many high school programs), significant savings can be attained.

By exploring factors that contribute to escalating costs simply <u>because</u> a project is big, "Small Schools and Savings" contradicts the false logic of borrowing "economies-of-scale" arguments from the factory model and applying them wholesale to building schools. Our investigation shows that there are countervailing economies in a flexible, adaptive approach to school planning, siting, and organization.

We encourage urban school planners to take advantage of the many opportunities to innovate, combine, re-envision and collaborate that the urban environment offers, and to correlate the needs and services existing in the community to be served. Many consultants

felt that simply scoping more projects in the $10-to-$20-million budget range would beneficially increase the bidding competition. Specific potential savings opportunities associated with the flexible approach we advocate include the following:

Use of Smaller Sites

- flexibility in site acquisition makes process more economical than when limited to large sites
- acquisition of small sites is often cheaper than the combination of city/private holdings required for many large sites
- greater selection of available land may bring greater opportunity to insist on good prices

Renovation of an existing abandoned or underutilized building

- does not require assembly of a new site,
- does not require Environmental Impact Statement (EIS)
- may allow reuse of existing foundation, facade, walls and/or bricks, etc.
- employs a different, less expensive labor market

Collaboration with other public agencies to incorporate smaller schools in multi-use facilities

- makes fuller use of costly public investment
- may draw on different funding streams to cover costs
- uses economies of scale to advantage without necessitating large schools

Integration with private- or public-sector construction or renovation projects (e.g. including a school in a commercial office building, or negotiating with a developer to incorporate a school in the construction or renovation of low-rise housing)

- uses the same site, EIS and ULURP review
- uses the same architects and other professional services
- uses contractors and materials already on location
- may find greater efficiency in the private sector

"Small Schools and Savings" urges that where appropriate sites are available, small schools be scoped, designed and estimated as thoroughly as large schools have been. Existing large schools can be renovated to accommodate small subschools; but it is largely unnecessary (and certainly inconsistent with insights about urban education) to continue building new, too-large buildings dedicated to schools.

With these premises in mind, "Small Schools and Savings" recommends that the Board of Education and School Construction Authority develop an updated school planning and construction strategy with the following key elements:

- New school buildings should be small or should house schools and other facilities together. If population density or site limitations in crowded neighborhoods absolutely require concentration of many students at one site, the buildings should be divided into schools-within-schools.

- New small schools should be planned and built in conjunction with new community development. In this way, savings can be realized from incremental expansion to meet population needs; coordination of public and private development; rehabilitation or reuse of materials; and multiple use of infrastructure, foundations and the buildings themselves.

- Planning for new schools in densely populated communities should fully explore the potential for obtaining small sites at advantageous cost and/or renovating existing small buildings for school use.

- School modernization plans should be revised to include interior reorganization into subschools.

- Modular school designs for pending new large school construction should be reappraised and modified, if necessary, to convert modules into autonomous subschool units.

- Planning for new schools should be coordinated with planning for other new social service facilities -- e.g., vocational training, recreation, health, early childhood sites, etc. -- that can appropriately be housed in community centers.

Such strategies and collaborations, vigorously pursued, offer new possibilities for savings, more productive and effective use of each agency's efforts and the resources of the private sector, and schools that are capable of serving our children better. ■

-- The Public Education Association

I. INTRODUCTION

Over the past decade, observations, studies and interviews with educators by the Public Education Association have confirmed a growing body of research by others: Students learn better in small schools because they feel more accountable, more significant, and more inclined to participate both in class and in extra-curricular activities.

A 1989 study[1] of 343 urban elementary and middle schools in Chicago, for example, found that smaller school size was the second most important factor in student achievement after family income level. Not surprising. Where participation thrives, where every student can make a difference, students take more pride in themselves and their achievements. Teachers, too, share in the motivating benefits of small schools: a 1991 survey[2] of some 13,000 urban elementary school teachers found school size to be the single most important factor related to how teachers embrace school reform -- more important than achievement levels, racial composition of a school, the student mobility rate, and the concentration of low income students. And, finally, for the growing number of students whose academic energies depend on access to social and personal supports, small schools make a community-centered approach more possible.

And yet small schools are rarely built in urban settings. As part of PEA's effort to rally citizen support for a building policy consonant with educational good sense and societal needs, "New Schools for New York," a 1990 design study project[3] cosponsored by PEA and the Architectural League, was undertaken; its exhibitions and documentation provide some practical guidance on small school design in actual New York City circumstances and locations. Issues pertaining to small schools' operating costs are separately

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[1] G.A. Hess, Jr., and L. Corsino, Chicago Panel of Public School Policy and Finance, "Examining the Effects of Intra-District Variation on School Size and Resources," March 1989.

[2] See "Charting Reform: The Teachers' Turn," October 1991, a survey sponsored by The Consortium on Chicago School Research.

[3] See this study's companion catalog volume of essays and design analysis, New Schools for New York, J. Frankl, R. Genevro, and A. Rieselbach et al., New York: Princeton Architectural Press, 1992.

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addressed in a related new PEA study[4].

It is the purpose of the present report, "Small Schools and Savings," to question and challenge the presumption that capital costs of school planning and construction render small schools uncompetitively and prohibitively expensive.

For a school as small as 400 to 500 seats (a size excellently suited to early childhood, elementary, and many high school programs), significant savings can be attained by adopting an opportunistic approach to building.

"Small Schools and Savings" presents a significant body of opinion, solicited through interviews and research conducted over an eight-month period in 1990, that, at least where a school is as small as 400 to 500 seats (a size excellently suited to early childhood, elementary, and many high school programs), significant savings can be attained by adopting an opportunistic approach to building.

If school builders welcome each occasion to innovate, combine, re-envision and collaborate -- all uniquely positive forms of what Architectural League director Rosalie Genevro has termed "urban opportunism" -- the long-dominant idea of "economies of scale" might be displaced, if not toppled, and ultimately be denied its heretofore definitive effect.

Our research, as narrated in the text of this report, convincingly points to common, specific options that allow small schools to be created cost effectively. These include:

- using small sites;
- opening up bidding competition to smaller contractors by scoping more projects in the $10-to-$20-million budget range;
- rehabilitating or renovating existing structures;
- sharing or creating multi-use facilities;
- coordinating school construction with other public or private construction projects.

There may be a fluctuating threshold at which the fundamental costs

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[4] See "Small Schools' Operating Costs: Reversing Assumptions About Economies of Scale," Susan Heinbuch, edited by Alice Smith Duncan, New York: Public Education Association, 1992.

of building a school are irreducible by strategies based on small scale, but our survey could not determine its limits. Wherever such a threshold may lie, we believe that if a small-school strategy should prove only slightly more expensive in a particular case, an added expense of 5%, 10% or even 15% would be justifiable in light of the educational benefits and long-term cost effectiveness of smaller schools.

Table 1, on the following page, summarizes some research findings concerning the effects of large schools on student, teacher and school outcomes.

On the second page following, Table 2 summarizes various studies and reports' recommendations on optimal school sizes to reduce negative outcomes associated with large schools.

Table 1

Impacts of Increased School Size

Researcher	Year	Outcome
Chubb & Moe	1990	Lower academic performance on SATs
Sorenson	1987	Difficulty in monitoring student progress; students tend to take courses of study beneath their ability
Gottfredson	1985	Negative perceptions of school safety
Gottfredson	1985	Negative perceptions of a school's administration
Goodlad	1984	Hampers effective school functioning
Boyer	1983	Hampers effective school functioning
Oxley	1982	Dropout risk
Oxley	1982	Disruptive school environment
Garbarino	1978	Vandalism and violence
McPartland & Dill	1976	Vandalism and violence
Grabe	1975	Noninvolvement in extracurricular activities
Coleman et al.	1974	Depersonalization
Loughrey	1972	Low morale among staff
Heath	1971	Reduced teacher contact with students
Turner & Thrasher	1970	Noninvolvement in extracurricular activities
Baird	1969	Noninvolvement in extracurricular activities
Wicker	1969	Noninvolvement in extracurricular activities
Tamminen & Miller	1968	Dropping out
Tamminen & Miller	1968	Weak student guidance
Plath	1965	Rule infractions
Kleinert	1964	Noninvolvement in extracurricular activities
Tyson	1957	Reduced teacher contact with students
Larson	1949	Difficulty in making friends

Note: Excerpted and Supplemented from: "Effects of School Size: A Bibliography," by Diana Oxley, Ph.D., Public Education Association and Bank Street College

Table 2

What Size Should An Effective School Be?

Source	Publication Name	Year	Recommendation
Elementary			
Goodlad	A Place Called School	1984	300-400
Middle			
NYC-BOE[a]	Design For Academic Progress	1983	800
NYC-BOE	Middle Schools Task Force	1988	600-750
Goodlad	A Place Called School	1984	400-600
JR/SR			
Goodlad	A Place Called School	1984	500-600
Secondary			
NYC-BOE	Committee Recommendations to the Superintendent of Schools	1965	600[c]
NYC-BOE	Task Force Report on High School Redesign	1971	150[c]
Coleman	Youth: Transition to Adulthood - Report of the Panel on Youth of the President's Science Advisory Committee	1974	500
Stanton, Legget & Assoc.	Planning Flexible Learning Places	1977	2000 with 250[c]
PEA[b]	Towards School Improvement: Lessons from Alternative High Schools	1982	800-1200
NYC-BOE	Design for Academic Progress	1983	2000 with 200[c]
Goodlad	A Place Called School	1984	800
PEA	Effective Dropout Prevention The Case for Schoolwide Reform	1988	500-1500[d]

Source: Public Education Association, Internal memo: December 1988.

a: NYC-BOE = New York City Board of Education

b: PEA = Public Education Association

c: Subschool Size

d: With Subschool/House Plan Organization

A. Why We Are Not Getting Smaller Schools.

As noted above, a preponderance of evidence shows that small schools provide a better environment for learning, and that their pupils--less frustrated and less alienated, more engaged and more motivated--are more likely to remain in school.

"Economies of scale," an idea rooted in the factory model and mass-production processes, has long been the cornerstone of arguments against building small schools. It can be defined for our purposes as the presumed relationship between an increase in the scope of a project or operation and a decrease in the incremental cost.

It argues that if a facility serving 1000 can be built for x dollars, a facility serving 2000 would cost less than 2x dollars -- not only because some spaces could be consolidated in a larger building, but also because of a lower cost per square foot due to more efficient use of labor and resources in large construction projects. After construction, a larger entity presumably enjoys parallel economies of scale in administration, operations, and purchasing.[5]

This was conventional wisdom in private business -- but we believe that what may be true for a factory is neither necessarily true nor appropriate for a public school. To start with, an overemphasis on "economies of scale" sidetracks us from a true judgment of cost effectiveness, which must first determine: Is a student from this large or small school more likely to graduate? Is this student more likely to go on to join a pool of skilled workers? Is this student likely to end up in jail or a drug rehab program or dependent on welfare? Is this student ultimately going to contribute to society or to be a drain on tax coffers?

We know that anything which keeps students in school is an excellent long-term investment. It has been estimated by the Carnegie Council on Adolescent Development (1988) that each year of secondary education reduces the probability of public welfare dependency in adulthood by 35%, and that a single year's class of dropouts, over their lifetimes, costs the nation about $260 billion in lost earnings and foregone taxes alone.

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[5] Again, see PEA's 1992 "Small Schools' Operating Costs" for analysis and rebuttal of this presumption in the context of New York City schools.

Additionally, research studies of industry strategy for capacity planning have found that industries and institutions which find themselves in an environment of rising costs and incremental growth beyond capacity (i.e., for present purposes, school costs and overcrowding, respectively) should:

1) Build small scale;
2) Renovate existing facilities;
3) Avoid the risk associated with the attempted exploitation of economies of scale, focusing rather on service, quality, and other dimensions;
4) Expand by full "acquisition" of existing capacity.

Source: Excerpted from Exhibit 2, page 426, in Survival Strategies for American Industry, Alan M. Kantrow, ed.; New York: John Wiley & Sons, Inc., 1983.

Assumptions underlying the range of presumed economies of scale have not been critically or systematically tested in the context of contemporary New York City schools. Instead, a tradition of large schools built in the past[6] -- and the existence of prototypical designs for new large schools -- tend to keep school planners from considering more creative and potentially cost-competitive solutions.

PEA finds the small-schools arguments so objectively powerful (see also Appendix, A Selected Bibliography of Small Schools Research) that we insist the final burden of proving whether small schools actually can or cannot be built competitively should appropriately rest with small schools' opponents. The findings detailed hereafter make it clear that they have not met this burden of proof -- and, if they honestly and imaginatively tried, could not.

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[6] See Anne Rieselbach's "Building and Learning," in New Schools for New York, Princeton Architectural Press, 1992.

B. Method and Aim of Research.

Because of the many variables involved, there is no definitive way to compare large and small school construction costs. As the range of designs we reviewed for the "New Schools for New York" project sites[7] revealed, the costs for schools of any size can be reduced or expanded depending on the generosity or scantiness of the amenities. As we will show, small school strategies appropriately rely on facilities sharing and on other economies that may reduce a structure's apparent luxury. Though in theory some of the same economies could reduce the costs of large schools as well, the flexibility and collaboration they require is rarely, if ever, achievable by large schools' bureaucratic administrators. Thus, a quantitative comparison proved elusive, if not impossible.

The issue was therefore addressed in a more "narrative" way. We:

- reviewed the literature on how other communities have been able to build small schools economically[8];
- interviewed experts in New York City;

> We asked our interviewees, all expert in fields related to construction and planning, "Having decided that we want to build smaller schools, what do you see as a means to get this accomplished?"

[7] The design study generated some 39 separate architectural treatments of small-school proposals for six representative sites in four boroughs.

[8] At least one of these studies, however, having to do with multi-use facilitites, did do a quantitative comparison. See footnote #27 herein.

♦ and collated their responses[9] to the query: "Having decided that we want to build smaller schools, what do you see as a means to get this accomplished?"

C. How to Create Smaller Schools.

As we consulted those experienced in construction, urban planning, politics, education, real estate appraisal and related fields, there was strong support for the premise that building smaller is inherently less costly.

Our consultants differed on whether and to what extent savings in building small schools could be realized from various specific factors. Experts variously saw savings, for example, in small contractors' greater flexibility in work scheduling; labor market considerations; variations associated with specific sites (such as the availability of air rights), epitomized in those selected for the "New Schools for New York" design study; and a range of other unpredictable cost factors, such as the building industry's

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[9] Sources of supporting and dissenting opinion include:

Jay Amos, Director of Technical Services, Office of Administration,
New York City Board of Education Division of School Buildings;
Krystal Brellocks, director, School Health Programs,
New York City Department of Health;
Abraham Biderman;
Barry Brooks, president, Adrian H. Muller and Sons Real-Estate Appraisers,
New York City;
Richard Coven, partner, Ambassador Construction, New York City;
Henry Gifford, general contractor, New York City;
Bernard Haber, partner, Hardesty and Hanover Engineering, New York;
Bob Kahn, senior director for project management,
New York School Construction Authority;
Craig Konyk, architect and urban planner, New York City;
Steven Manna, program operations officer, New York City Transit Authority;
Joseph Neuman, chair, The New York Building Congress, New York City;
Beverly Reith, director, Environmental Review Program,
New York City Housing and Preservation Department;
Leslie E. Robertson, partner, Leslie E. Robertson Associates, New York City;
John Russek III, chief executive officer, Boro Lumber Co., New York;
Norbert Turkel, AIA, partner, Turkel Collaborative, New York City;
Lance West, director, Charles H. Greenthal Realty, New York City;
Linda Wolff, director, Vacant Cluster Program,
New York City Housing and Preservation Department;
Lillian Zaita, director, New York University Midtown Center.

PEA gratefully acknowledges the assistance of these and other individuals and organizations who assisted in preparing "Small Schools and Savings."

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strength or weakness at any given time.[10]

There was, nonetheless, a 'critical mass' of confidence that a flexible strategy, one which takes advantage of the interface between the opportunities a neighborhood affords for cost-effective building and its combination of educational and community needs, would yield significant economies. Virtually all those we interviewed challenged the assumption that a few prototypical large-school designs will bring economies of scale that override all other potentials for savings.

The question of strategy takes on special importance because New York City public school construction is now being conducted under radically new auspices. In 1988 the state legislature created the School Construction Authority (SCA), with a mission to build approximately thirty-five schools over the following ten years. The SCA's Five Year Capital Plan now in effect (1990-1994) details cost projections for site acquisition, design and construction -- as well as the size and capacity of the schools -- at levels that seem both high and arbitrary. If its strategy toward determining size was, instead, inherently flexible and placed emphasis on correlating the needs, savings opportunities, and services existing in the community to be served, small schools and their attendant advantages could be expected to proliferate.

Potential savings opportunities associated with such a flexible approach include the following:

Use of Smaller Sites

- flexibility in site acquisition makes process more economical than when limited to large sites
- price of small sites is often less than the combination of city/private holdings required for many large sites
- greater selection of available land may bring greater opportunity to insist on good prices

Renovation of an existing abandoned or underutilized building

- does not require assembly of a new site,

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[10] Other questions to be asked go beyond design issues to functional and programmatic ones. If a school cannot provide a gathering space for dramatic functions during school hours, can its drama club operate after school hours in a classroom space? And is a large auditorium that can bring an entire school together -- which certainly makes a contribution to the school's social cohesion -- more or less important than the increased participation in all aspects of school life that takes place in a small school? There are no clear-cut answers to these secondary questions, but there will never be any until they are asked.

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- does not require Environmental Impact Statement (EIS)
- may allow reuse of existing foundation, facade, walls and/or bricks, etc.
- employs a different, less expensive labor market

Collaboration with other public agencies to incorporate smaller schools in multi-use facilities

- makes fuller use of costly public investment
- may draw on different funding streams to cover costs
- uses economies of scale to advantage without necessitating large schools

Integration with private- or public-sector construction or renovation projects (e.g. including a school in a commercial office building, or negotiating with a developer to incorporate a school in the construction or renovation of low-rise housing)

- uses the same site, EIS and ULURP review
- uses the same architects and other professional services
- uses contractors and materials already on location
- may benefit from private sector efficiencies

At times these possibilities may be mutually exclusive, but at others they may be combined to advantage: for example, when a small school project is integrated with private renovation instead of new construction on vacant land, maximum cost effectiveness can be achieved.

A small school project integrated with private renovation instead of new construction on vacant land, can achieve maximum cost effectiveness.

II. The POSSIBILITIES of INHERENT SAVINGS in SMALL PROJECTS

As we review the variety of cost-cutting methods available under different circumstances in different neighborhoods where small school construction is needed, our bottom line remains very simple: We urge that where appropriate sites are available, small schools be scoped, designed and estimated as thoroughly as large schools have been.

Of the $244 per square foot estimate for prototype "large strategy" designs (1200 to 2500 pupils) prepared by the SCA in 1988, one partner of a Manhattan-based general construction company[11] commented: "That sounds really high, considering that a first-class office building costs between $100 and $130 per square foot." There are undoubtedly many reasons, some of which would make this discrepancy less shocking than it seems. The question remains: Are there factors that contribute to escalating costs simply <u>because</u> a project is big?

The answer appears clearly to be yes. It is always faster to build a small school than a larger one, and saving time saves money for society as a whole, regardless of how the costs of borrowing and interest payments are allocated by public-sector budgeting methods.

Further, we found that many builders and other professionals in construction management believe that smaller contractors are more "streamlined" than their larger counterparts. Our interviews also raised issues of more flexible scheduling, lower overhead, leaner organization, lower risk of delays, increased competition and availability of work force.

■ **Smaller schools take less time.** The requirements of time and interim remedial measures associated with larger schools may work against them. Let us assume that we may accept the estimates in the Five Year Capital Plan for schools of various size. Due to the way public funds are borrowed in the capital markets, the deleterious effects of prolonged construction are less than they would be in private construction: money is borrowed only as the

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[11] Richard Coven, Ambassador Construction

need for it is projected, although inflation, wage increases and other direct costs are charged against the total.

What would be the true cost, all other things being equal, of one 900-seat school budgeted at $29 million, as compared to three 300-seat schools at $11.5 million each[12]? Assume that the additional construction time required for a large school is 12 months, and that the adjustment busing 900 students for one additional school year would be $372,600. And the cost of leasing 90,000 square feet for interim use would be $540,000.

So between $1,039,000 and $1,207,000 in time and remedial costs should be added to determine the true cost of the single large school: more than a million dollars. The three smaller schools cost $35.7 million (in 18-month dollars) versus $30.6 million (in 30-month dollars), a premium of only 16%.[13]

■ Smaller projects have simpler, more flexible work schedules. On a big job, organization and planning are the major challenges; larger ventures usually require a general contractor and an array of subcontractors, which inevitably means more overhead for coordination. Moreover, the complexity of large projects generates costly delays; given the size of the projects that the SCA has planned and the nature of business, it is reasonable to believe that bidders take this into account and build a corresponding cushion into their bids. Delays that would be disastrous on a closely estimated larger project can more easily be worked around on a smaller one. Henry Gifford, a contractor who has worked on projects ranging from restaurant construction to 20-unit housing renovations, explains:

> "In most jobs, you are dealing with companies that have to increase and decrease their work force size by 50% at the beginning and end of the job. There is a limit to how many guys can work at one place at one time: three guys can work on bathrooms, not fifteen. Small companies can better cope with the natural rise and decline in numbers of people needed at that site over the duration of the

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[12] Using the SCA's Five Year Capital Plan numbers as proxies, a 900-seat school costs from $27.1 to $30.55 million; a 300-seat Early Childhood Center costs from $9.4 to $16.3 million; and a 360-seat annex costs $12.4 million.

[13] This small differential could be reduced even further if other aspects of the flexible strategy advocated herein were applied.

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project, because they can take on small projects, one or two day things, to economically fill in. Huge companies can't fill in with jobs of less than several months. It isn't economical to them."

And, Gifford further noted,

> "You are not paying the plumber to put the pipe in, but to be there at the right time. Putting in the pipe only takes a finite amount of time, while waiting around to put it in, unnecessary delays, petty union rules about who can do what when, and so forth run up the bill. On a bigger job, you need a whole system to keep track of the details. Things have to be planned and pinned down more because a delay could be a disaster."

John Sussek III, chief executive of Boro Lumber Company, corroborated this point, adding:

> "The quality of work is generally better with small, well-run construction companies. The larger construction-management type companies lose control of their sub-contractors. That leads to tremendous cost overruns. If a $50 million school will take 5 years, by the time you get to three years, you have to add on an extra few years and $20 million dollars [because it is behind schedule]."

■ Smaller projects also benefit from a larger pool of bidders, and greater competition fosters lower costs. Authorities with direct experience in public construction programs supported the thesis that there is a larger pool of bidders on smaller projects.

Linda Wolff, for one, director of the Vacant Cluster Program in the NYC Housing and Preservation Department, explained that when her office initially sent out requests for proposals (RFPs) on renovation of abandoned city-owned tenements, they received only three to four bids from a dozen prequalified large general contractors. The prequalification process required the contractors to be capable of $35 million in bonding, to have completed jobs of 600-700 apartments, and to have considerable rehabilitation experience. In the first round, totalling $48-$50 million for a package of 23 buildings, the lowest bid came in at $115,000 per unit from these large general contractors.

For the second round, Wolff said, HPD was able to increase the number of bidders fourfold by breaking the package up into 8-building groups, requiring a bonding of $16 million.[14] Out of fifteen prequalified contractors, twelve to fourteen bid. The lowest bid came in at $64,000 per unit -- or 56% of the best bid from the larger general contractors.

"For a $2 to $3 million job, there are sometimes more than a dozen bidders... Above $10 million, you get two or three guys, possibly four, and the same guys over and over again."

Steven Manne, deputy vice president of Program Operations in the Engineering Department of the NYC Transit Authority (TA), also agreed that smaller jobs foster greater competition and lower costs. The TA's overall construction program is $1.3 to $1.5 billion per year, but Manne considered a $12 million job (a reasonable estimate for a new small school) to be in the middle range for construction projects, and roughly $10 million to be a threshold below which there is a much larger number of bidders.

"We keep records that go back a few years on the number of bidders versus the size of job, versus the range of bids, and versus the type of work," Manne said. "For a $2 to $3 million job, there are sometimes more than a dozen bidders. Under $10 million, you get five to ten bidders. Above $10 million, you get two guys or three guys, possibly four, and the same guys over and over again[15]."

A Board of Education construction expert[16] demurred, saying the competitive argument doesn't hold true in school construction because there are only a certain number of contractors capable of working on schools. "A school is a more difficult job than renovating an interior or building a commercial building. The skills and materials are much more sophisticated. School building

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[14] In Wolff's words, "The $16 million for the medium-sized contractors was somewhat of a stretch for these guys." The bidders also needed to obtain a commitment from a bank to post an irrevocable letter of credit at ten percent of the construction cost. In order to pass the stiff prequalification requirements, she recalled, some of the contractors formed joint ventures, combining their financing capability and other resources so they could rehab 200 to 300 units at a time.

[15] Echoing the observations of our earlier cited interviewees, Manne attributed this to the risk of delays on larger projects. "The contractor [on larger jobs] is assuming a lot of risks because we can delay the project, and he can't easily redeploy the people."

[16] Jay Ames, Director of Technical Services, New York City Board of Education Division of School Buildings; telephone interview, June 1990.

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is complicated by fire safety, handicapped laws, and so forth."

Manne, however, disagreed, noting both that the two agencies work with the same contractor pool and that the TA has its own unique requirements. "In some ways," he said, "a school is easier -- it is straightforward construction. One floor looks like the next. We do tunnels and elevated structures. The floors have to carry exceptionally heavy loads, and [we have] storage of hazardous materials.... [These are] all problems which schools don't face."

Norbert N. Turkel, AIA, the managing partner at a firm[17] experienced in space planning and school design, confirmed the positive experience of increased competition on smaller contracts. In a 1990 project, he had 28 bidders for a renovation of an institutional building estimated at approximately $750,000. The bids covered a wide range, including some that were 30% below estimates.

We asked, Would a construction job for a 300- to 500-student school be small enough to maintain a leaner office staff, to be accomplished with less risk of delays, and to attract middle-sized contractors who otherwise might not bid? Or would such a school already exceed the limits of "smallness" for purposes of construction cost savings?

A project manager with the Port Authority of New York and New Jersey argued that $20 million represents a good-sized project, one that cannot be considered "small" for bidding purposes. Mr. Turkel concurred: "On a typical school, imagining that it would cost in the neighborhood of $20 to $25 million, only a limited number of contractors could bid, perhaps half a dozen." Mr. Manne of the TA and Ms. Wolff of HPD agreed with the premise that contracts of less than $20 million would be attractive to more bidders than larger packages, and would save the city money.

■ Our interviewees agreed that while some costs are relatively inflexible, various factors can make the "brick and mortar" costs of small schools less expensive. Most felt that design fees, legal fees, and other professional costs are relatively insensitive to the size of a project, as are the costs of demolition of existing structures. Consequently, they are better distributed in the overall costs of large projects. But these costs make up a

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[17] Turkel Collaborative, Architects, of New York City.

relatively small proportion of the total.

The bulk of school building expenses are the direct costs of construction. Here, many experts agreed, various factors can make it less expensive to build small than large; these differences are made more pronounced when comparing low-rise with multi-story construction. Many costly and, in the case of smaller buildings, perhaps excessive regulations exist to address issues peculiar to large structures. If the BOE's construction standards and mandated specifications were thoroughly reviewed, several interviewees argued, cost savings could likely be attained without sacrificing safety in well-designed small schools. Costs applied to each of the trades -- general construction, HVAC (heating, ventilation, air conditioning), electrical, plumbing, and fire protection jobs, and so forth -- stand to be reduced. Interviewees also suggested potential savings could be gained if several trades were contracted out together, an option not available to large projects.

■ The issue of the current labor market. Some of those we interviewed believed that any enhanced competitiveness enjoyed by smaller projects is currently outweighed by the influence of today's severely depressed building industry, which a priori makes for more competition. The general consensus is that as the private market for construction is drying up, the public market should have more contractors competing for a piece of the pie.

Bob Kahn, Senior Director for Project Management at the SCA, said he believed that the current program (approximately $800 million dollars in construction per year) is large enough to bring in bidders from outside the metropolitan area. In this case, he said, it would be a question of time before other firms not currently working in New York City would raise the competitive stakes for large companies as well by coming here to participate in the bidding process. And an expert at another public agency made the point that if the size of the contracts were within reach of the medium-sized general contractors, they might repeat the experience of the HPD program insofar as "people would form companies just to bid."

Mr. Ames of the Board of Education disagreed strongly that smaller projects would have the advantage of enticing more bidders. "The laws of supply and demand operate. Since the schedule [of the five year plan] is compressed and the amount of work is enormous, you will saturate the market [regardless of the size of the proposed

buildings]. A single contractor can afford to wait, because as all the contractors get busy, he has already covered his overhead, and he knows there are more contracts out there."

In the long term, the issue on which these commentators disagree may mean little. The motivation for smaller schools requires a clear and long-range perspective: the boom-and-bust cycles of the construction industry are shorter than the lifespan of the ideas that shape public policy and planning. So if there are indeed advantages to smaller schools in terms of the competitiveness of the bidding process, they should be pursued despite temporarily prevailing or countervailing factors.

In the final analysis one must ask, Which is more likely to build inexpensively? A contractor with more fixed overhead, or one with less? A company running the risk that an unexpected delay will leave it with hundreds of idle workmen to redeploy, or one with fewer employees? A bidder secure in the knowledge that only a few firms in the city are large enough to bid on the job, or one that knows it is competing with a greater number of medium-size operations?

III. SAVINGS Through SITE SELECTION

A shrewd shopper for school sites should not automatically rule out smaller parcels of available land, whether or not they are city-owned. Large parcels are hard to come by in densely populated areas, and the time and money required to assemble a large site from several lots raises its cost. The city's usual site selection process for a future school considers city-held property first. By assuming large schools (and therefore certain minimum site dimensions[18]), the city often draws from an unduly restricted portion of that pool, or finds itself forced to acquire an adjacent private parcel. In general, only as a last resort does it acquire a site entirely in private hands.

It was our initial thesis that small parcels of land are more cost-effective because the competition for larger sites makes them disproportionately more costly to acquire. We found, however, that there is no simple or consistent relationship between the cost per square foot of a large site and that of several small sites of comparable usable square footage.

In some cases -- when, for example, a seller knows that the buyer needs a given parcel to complete a large site -- a small parcel may command the highest premium, a premium informed sources estimate may range from 25% to 60% of the total price. In other cases, depressed market conditions, or zoning that limits income-producing potential, might make a small lot less marketable and therefore less expensive.

Small sites <u>are</u> viable: once one has a design to work with, the challenges they pose can be met with thoughtful planning. One of the "New Schools for New York" design study projects demonstrated that it would be possible to put a robust small school on one such site, a small corner lot of approximately 8,000 square feet.

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[18] Ideally, a school site should be chosen by seeking the best combination of desirable characteristics -- location, proximity to public transportation, facilities or other services or public spaces, etc. Subject to maximum size limits, a site that is well-suited for a school and having, for example, a footprint and Floor Area Ratio (FAR) able to support a 400-student school should not be discounted because a 600-minimum population has been arbitrarily targeted. This, however, is the current SCA practice.

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A Site-Search Example from Washington Heights. Craig Konyk, a New York architect and urban planner, performed an initial site search in CSD 6 of Washington Heights, a district with drastic school overcrowding conditions which are expected to continue for the foreseeable future. Excluding sites with gas stations, condemned buildings or shells, he identified at least twenty-seven sites with strong potential for school construction. All were "soft" sites -- that is, they were empty or had only a one- or two-story structure on them, possibly a garage, but not a domicile.

The sites ranged from 100' x 40' across the street from a playground -- which would be suitable for a small school of pre-K through second grade -- to a lot of 225' x 80', currently a two-story garage, which is owned by the city. Some of the twenty-seven sites are composites of smaller parcels, while others are in the hands of a single corporation or individual.

In Washington Heights, a lot not on a commercial thoroughfare would typically have a floor/area ratio (FAR) of 3.4 for residential use, and an FAR of 6.5 for a community facility like a school.[19] Assuming a 600-student minimum or approximately 66,000 square feet (in keeping with the recently constructed P.S. 234), the minimum lot size would be 16,500 square feet, or approximately 100' x 165', at an FAR of 4.0. Of the twenty-seven sites, only eleven (38%) are this size or larger.

But for a school of half the size, one could select from among the entire set of twenty-seven sites, and base one's selection on other significant factors as well: Which parcels offer "extras" such as access to playgrounds? Which are in the region of most over-crowding? Which provide the safest access/least risk to children? and so forth.

Further, our analysis of Real Estate Board of New York data on over 100 early-1988 Washington Heights real-estate transactions of properties -- comparable to the Washington Heights "New Schools for New York" site -- convinced us that under certain zoning and

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[19] An FAR stipulates permissible density: a higher FAR means that the building can have more floor space per unit of ground area; a lower FAR means that the building will be more compact, or it may incorporate more open space than otherwise. Increases in the FAR are often granted in return for other amenities or concessions to the public interest.

market conditions, acquiring small sites from private sources at reasonable market rates can be a cost-effective alternative to the more typical process of piecing together a larger site out of city-held and privately held land. Where a private developer might not put rental housing because of an unfavorable projected return on investment, a small school might well thrive.

Increased Range of Choice. In the end, it is the range of choice that defines a buyer's market. As pointed out by a leading real-estate appraiser[20], neighborhood and zoning factors might turn the situation to the small land purchaser's advantage if the lot is zoned for housing. The owner of a small site zoned for R7 (medium-density housing), he suggested, would be eager to sell. "A private developer would not put housing in there today because he could never get the rental to make a decent return on his investment." The city might thus achieve savings in site acquisition which are currently ruled out by the insistence on larger sites.

Alternative Options for Large Parcels. In addition, a small-site approach would realize ultimate savings by increasing the city's options for parcels which could serve uses that require larger sites (parks or hospitals, for example) or be resold to the private sector. It is reasonable to believe that in at least some cases, a large parcel may be more valuable to the city in a commercial use, which pays property and corporate taxes as well as providing jobs, than if used for a school.

The Community Reaction Factor. It must also be taken into account that community reaction to the proposal of almost any public facility is often confrontational. Schools are hardly exempt: community members have legitimate concerns about the extra traffic generated, about children and noise, teacher parking, and so forth. In most of these respects, smaller schools have a smaller impact, and are consequently easier to "sell."

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[20] Henry Brooks, president of New York real-estate appraisal specialists Adrian H. Muller & Sons.

IV. SAVINGS THROUGH RENOVATION

Our interviews, which in many cases revealed firmly held and often contradictory beliefs, found a strong and rare consensus of opinion on one point: Renovation in New York City is much cheaper than new construction, even on sites requiring extensive reconstruction.

Renovation is a "mother lode" of potential savings in time and money. In terms of time, neither extensive site testing nor, in many cases, an Environmental Impact Statement (EIS) or other reviews are needed.[21] (Although the SCA is exempt from city environmental reviews for its first five years, the need for schools will outlive this exemption, and we are seeking ways to permanently telescope pre-construction time.) As for direct cost savings, they are of two kinds. First, some or all of the existing foundation and envelope may be re-used. Even major modifications, such as staircases and rooftop play areas, may be accommodated by reinforcement of existing walls and floors at much lower cost than in new construction. Second, renovation often employs a different, less expensive labor market as well.

Renovation is a "mother lode" of potential savings in both time and money.

The level of potential monetary savings seems, at least anecdotally, compelling. The architect of a private school in a cluster of four buildings in Harlem[22] ventured a general estimate that renovations were up to 25% less expensive than new construction. Another interviewee, a contractor experienced in Manhattan renovation, cited an employer that routinely estimated new construction at three times the cost of renovation. He explained: "Paperwork, zoning, plans, unions -- they never use unions to renovate a shell, except on a big thing.... [and] Demolition is cheap. You just write a check and it happens. With new construction, you tell the plumber that in three weeks I'll be

[21] According to Beverly Reith, Director of Environmental Review at HPD, if there are no discretionary actions (e.g. zoning changes, special permits, disposition of city lands or urban renewal plans), a city environmental quality review does not appear to be required -- although an analysis of funding would be needed to be sure in a specific case. A shorter state environmental quality review would still be required under state law.

[22] The Storefront School; see text example on following pages.

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ready for you, but all the delay problems don't go away."

One developer recounted the experience of bidding successfully on a tenement renovation project, only to find that the buildings to be renovated had collapsed; the bottom line was in fact little changed, he found: as long as the site didn't need clearing, didn't require pouring a new foundation, didn't give rise to delays for zoning variances, etc., his firm could still make a profit even with 100% wall and beam replacement.

By most estimates, gut renovation to a class A apartment costs $60 to $75 per square foot. This includes removal of old fixtures and some repair of rotted or burnt beams. By comparison, according to Abraham Biderman, the last Commissioner of Housing Preservation and Development in the Koch administration, new apartment construction in buildings from six to twelve stories tall costs between $185 and $215 per square foot. To repeat, the SCA estimates that its new school construction will run about $244 per square foot.

The comparison calls for further analysis: schools need a lot more than replacement of burnt out beams. The class of construction required for public buildings is inherently more expensive than residential ones because of stricter regulations about safety, fire hazards, etc. And renovation may be likely to entail asbestos removal, a costly procedure that would be needed for school use of many pre-war tenements and some older public buildings.

Yet in other, important ways, a school is cheaper to construct than an apartment building. It has larger rooms and thus fewer walls. It needs less wiring because one switch panel serves a larger room. It needs only one set of bathrooms per floor. It uses a single, central kitchen and eating space.

Brownstone-Scale Renovation. Could one fit a school into a brownstone? Many private schools have done so. And look at the ingenuity architects have exercised in private brownstone renovation for offices as well as homes and other uses, and apply it to the special needs of a school. One could open non-load-bearing walls to combine existing rooms for larger areas. One could be creative in adding a second fire exit by adding an extension to the existing structure. For each challenge, there is a creative solution.

Brownstone-scale renovation makes sense in many ways. There are

many such buildings available. One could easily take a small brownstone as a sample case, and then replicate the plans and solutions in other locations. Many firms have records of successful adaptive re-use at this scale. Even if putting small schools in brownstones were to cost twice the going rate of $60 to $75 per square foot for renovation as housing, it would be much less expensive than new construction on the scale favored by custom and -- so far -- by the SCA.

Collaborative Planning. It seems unlikely that the city will find itself "short" of buildings which can be acquired by foreclosure in the current economic environment. A New York Times article (April 16, 1990) noted that 3,000 tenement buildings were yet to be renovated under an HPD housing program. With political and administrative commitment some of these could be transferred to the Board of Education's portfolio.[23]

In fact, of course, it would require a political and administrative commitment to make such a transfer happen. There is currently little effective collaborative planning between housing and school authorities. The problem of bureaucratic "turf" must be handled by city and state officials at the highest levels.

Larger Properties. Renovation of larger properties can also make sense, whether they are public or commercial buildings. Such properties are very frequently available, particularly in changing neighborhoods.

Companies that relocate from the city vacate "recyclable" work spaces with tremendous potential. Let us keep in mind that renovation of a vacant or underutilized part of a building can make sense, too. One builder reminded us: "There once was a classy hotel in downtown Brooklyn [that] became an SRO. But what were they going to do with the pool and health facilities in the basement? They renovated them, and re-opened them as the St. George Health and Racquet Club. It is thriving; an ingenious use of what's existing. The opportunity for something worth a dollar to be bought for fifty cents is always there."

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[23] It has been suggested that use for a school of a facility that otherwise would be used for housing does curtail the housing supply. Yet housing programs that do not provide a community with adequate educational and social service facilitites frustrate efforts at neighborhood stabilization and will not be cost effective in the long run. The objective of a housing program should be not only to increase the number of "housing units," but also to attack the causes of homelessness.

Two Examples of Renovation.

Below we provide two examples of renovation plans: the expansion of the Storefront School, at 129th Street and Madison Avenue in East Harlem, and P.S. 90 in central Harlem, one of the "New Schools for New York" design study sites.

The Storefront School. The Storefront School is a not-for-profit private school for children from preschool through eighth grade. As of 1991, it had approximately 100 students and planned for growth to 120. It occupies two four-story row houses, and plans expansion into two adjacent buildings across the street. The entire footprint including a narrow, adjacent lot is only 50'x50'. (The construction area itself is somewhat smaller, 44'x50', due to setback requirements.)

The school demonstrates how creativity can answer the need for major structural changes, required by codes, in a confined area. In order to comply with Local Law 58, a Building Department regulation which mandates that most buildings have to be accessible to the handicapped, an elevator was required as well as two staircases. This might have been considered an impossible demand on the limited space: but the architect met the challenge with an exterior stair tower on an adjacent empty lot.

On each floor there are two classrooms and two specialty rooms that can be used as seminar, reading, library or computer rooms. These are created by knocking out a roughly 7' stretch of an existing partition wall, which will allow two doors and a wall to separate the future rooms. Play space is provided by a pre-existing 60'x40' backyard.

By renovating rather than building anew, the Store-front School avoided the six to twelve months normally required for environmental review. Even though a zoning variance was required[24], its estimated renovation time was nine months, at a cost cost between $1,000,000 and $1,500,000 for approximately 9,000 square feet -- $111 to $166 per square

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[24] In most brownstone renovations, zoning variances are only needed if additional floors or rooms are being added (no variance is required for fewer rooms). The Storefront School did require a zoning variance, however, because its site falls within a C-8 commercial district extending 100 feet west of Park Avenue. Due to the peculiar requirements of this zoning category, a vocational or trade school would not have required variance, while a public or private school does.

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foot, including the cost of site acquisition and building purchase. The Storefront School, at just 120 students, is on a scale even <u>smaller</u> than that we propose.[25]

P.S. 90 in Harlem. Our second example, one of the projects considered in the PEA-co-sponsored "New Schools for New York" design study, would renovate Harlem's old P.S. 90, a school closed years ago, as a multi-use combination of a smaller new school and other community and health facilities. It was targeted to serve 250 high school students; over 100 children in an Infant/Toddler/Early Childhood Center; 50 to 60 patients a day at a Health Clinic; and to house other small-scale community facilities including a senior citizen's bureau, social services offices, and parent/adult education spaces.

P.S. 90's neighborhood is the locus for the Bradhurst Neighborhood Redevelopment Plan, produced by the Harlem Urban Development Corporation to meet housing and community needs. A multi-purpose renovation of this site could be an "engine" or centerpiece for revitalization of the surrounding neighborhood. In the past such roles might have been filled by settlement houses, but a settlement house does not always include a school, nor is there one in this neighborhood. Using city-owned land and city-owned buildings appropriate to school renovation <u>in situ</u>, the city could begin on a fast track by saving the time for site selection and acquisition, which could otherwise be a year or more.

Many "New Schools for New York" design entries successfully addressed the numerous physical challenges of the P.S. 90 renovation: separate entrances for the cohabitation of the school and a community center that did not segregate the facilities and their users; security issues; controlled circulation; and the permanence of certain activities requiring dedicated space (mainly occurring during school hours), in contrast to the need for flexibility and maximized dual use of spaces wherever possible.

One entrant broke the existing envelope to create a new, glass-enclosed library. Another team took the "smaller is

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[25] We note as well that Horace Mann, a respected private school, puts approximately 200 2-1/2- through 5-year-olds in its five story structure.

better" concept to heart and radically diminished the final mass, knocking down the center walls of the old H-plan school and leaving the two halves standing separately.

Renovation of Other Building Types. While P.S. 90 was formerly a functioning school, various other building types can also provide potential renovation targets.

According to a modernization coordinator at the New York City Housing Authority, vacant factory buildings and warehouses[26] are ideal for adaptive re-use of their structure. The first criterion, he stressed, is the condition of the structure and the soundness of its walls. A multi-story factory or warehouse could be subdivided vertically (with a school on lower floors). Alternatively, it could be divided horizontally, with the school using a side street entrance. As an architect and hands-on renovator himself, this design professional enthusiastically pointed out, "There are incredible ways of being innovative in a typical structure. The kids would have space. You can give form to your own circulation patterns within the four walls, put in partitions, and redesign the interior space."

A Model for Emulation by the SCA. HPD's most successful building program to date, the Special Initiatives Program (SIP), has capitalized on the cost advantages of private-sector development to renovate thousands of empty shell buildings, and create housing for low- and moderate-income families. In terms of speed of construction, the program's record is impressive. Every developer is given 24 months to complete the renovation of buildings with between 10 and 40 units. Typically, a six-story walkup with three to eight apartments per floor might take 12 to 18 months for the construction phase, in addition to a year of pre-construction work.

Compared to the BOE's record of eight to ten years to complete one school, this program is a model for emulation by the SCA. While a pilot project might require more than 30 months, it is reasonable to expect that as it is replicated, the SCA could shave as much as one-third from the time in renovation, and even more in planning by

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[26] Consider the new Reich School in Brooklyn, a small alternative high school in a former warehouse donated to the Board of Education by private citizens.

concurrently designing and putting out for bid multiple sites. Renovation along these lines should be possible at savings of at least 25%, and quite possibly more than 50%, compared to new construction.

V. SAVINGS Through MORE IMAGINATIVE ORGANIZATION of SCHOOL SPACE

A general rule of thumb attributes one-third of a school's construction cost to building an auditorium, gymnasium and cafeteria.

But some spaces can be used efficiently for different purposes at different times; instead of a dedicated auditorium, for example, a small school could have several adjacent classrooms with flexible partitions that could be used as a gathering space when the need arose. Similar exchanges may be available for labs, vocational training areas and other specialized facilities. History and common sense have often demonstrated the satisfactory use of a building's roof for gym space or of an adjacent park for a playground.

Renovation without "bricks and mortar" is another possibility to widen the array of options. The Public Education Association has been involved since 1988 in advocating and evaluating plans for "schools within schools." To establish the "houses" now mandated in zoned neighborhood high schools and modeled in some community middle schools -- but applicable in elementary and middle schools as well -- such plans could involve segmenting hallways and classroom wings with minimal renovation.

VI. SAVINGS THROUGH MULTIPLE USE

In a neighborhood where social services are needed, multi-use occupancy incorporating a small school offers both economic and functional advantages. From the economic perspective, evening, weekend and summer use increases the return on a costly public investment. Of special value are dual-use spaces that can serve different functions simultaneously or, more commonly, at different times.

By carving out a small space for a school in a larger building, it may be possible to combine general economies in construction with the educational advantages of a small school. Obviously the agency or agencies responsible for non-school functions should bear a proportionate part of construction costs. From the urban planner's perspective, a combined school and community facility (as noted in our previous discussion of renovation plans for old P.S. 90) could well serve as the "engine" for community revitalization.

Many school/community centers have been attempted in the last two decades, with varying degrees of savings. In some cases, comparison is difficult because a building constructed with the pooled resources of several agencies was larger or more ambitious than what would otherwise have been built. A President's Commission on School Finance document[27] estimated the potential for savings -- the difference between what schools "paid for" and the value of the space they used -- as ranging from 0 to 44 percent. The high-end figure of 44 percent represents a case in which the school board was able to pay lower rental fees, resulting in considerable savings, in exchange for favorable financing for the commercial portion of a public/private development.

We will examine specific cases to highlight savings achieved in several ways:

- through fuller utilization of the building,
- through inclusion of joint- or dual-use spaces, and
- through economies in construction.

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[27] "The President's Commission on School Finance Report," prepared by Cresap, McCormick and Paget, Inc. International, 1971.

In reality, of course, these types of savings overlap. In most cases, school construction money was combined with funding from other local or municipal agencies and state and federal government programs.

- **Fuller Utilization.** At the Quincy School in Boston, Massachusetts, a school and school-related building were intimately connected with a housing and community facilities building. While the school building portion was entirely funded by school sources, its gymnasium, swimming pool, auditorium, dining area and health facility were intended for community use as well: in sum, approximately 40% of the space serves a much greater population.

  In Washington Heights, a "New Schools for New York" design study project explored the feasibility of building an early childhood center/community center. The predominantly Spanish-speaking neighborhood has many recent immigrants and many young and poor residents. It has serious drug problems and an alarmingly low level of prenatal care; this is one of the most overcrowded school districts in New York.

  The study's RFP for the site at 501 West 172nd Street proposed a school for 200 children from pre-kindergarten through second grade. In addition, infant and toddler care, a health clinic, and possibly other community facilities would be included. Most classrooms and offices would be dedicated spaces, while the health facilities would be shared by the students and their families, possibly with the community at large.

  In costing out our designs, we assumed that capital construction would be funded by the Agency for Child Development (ACD) as well as the Board of Education. The school authorities would pay for the health clinic, thus representing no actual savings to the education system.[28] Cost efficiencies would be achieved primarily by drawing on diverse funds for capital outlays and operating expenditures, and more fully utilizing the building to meet various community needs.

  The "New Schools for New York" design study for the renovation of P.S. 90 (see discussion in the preceding section

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[28] According to Krystal Brellocha, Director of the School Health Program at the Department of Health, this is not unprecedented: the BOE has traditionally built medical rooms into its schools using education dollars. Schools basically "host" services that serve schools. The BOE is currently building school-based clinics in five locations.

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on renovation) is similarly predicated on meeting multiple community needs and drawing upon construction funds from various authorities. While the original RFP did not require dual use of spaces, many of the architectural designs presented innovations to be "revised and reformed" to more fully utilize a costly public investment, and make it attractive to external co-funding agencies.

- Dual-Use Spaces. The Human Resources Center in Pontiac, Michigan[29] serves two needs on one site. A school with community-oriented space was built in a deteriorating downtown neighborhood to help reverse its decay.

  The project was funded by the school district and the U.S. Department of Housing and Urban Development (HUD) in a roughly 75:25 proportion; HUD funding provided a community auditorium/theater, gymnasium, health station, arts and crafts center, and cafeteria, to all of which the school has access. The community facilities were larger than they would have been otherwise, and there was no incremental cost to the school board -- which "saved" approximately 5% on construction, in that it had use of a bigger and better facility than it paid for.

  In Atlanta, Georgia, a combination of a HUD grant, a private foundation grant, and the local school board provided the money for construction of the John F. Kennedy Community Center[30]. This center brought together a middle school, district-wide education offices, a complex of community services including a senior citizen's center and vocational counseling center, and dual-purpose facilities including a gymnasium, library and swimming pool. The school board funded only 70% of construction, but the school makes use of 80% of the built environment.

  At the Thomas Jefferson Junior High School and Community Center in Arlington, Virginia[31], extensive athletic and recreational facilities designed for community as well as

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[29] Described in "The President's Commission on School Finance Report," prepared by Cresap, McCormick, and Paget, Inc. International, 1971.

[30] Ibid.

[31] Ibid.

school use were incorporated into a school. Construction bonds were floated jointly by the local recreation agency and the school agency. In an estimated construction budget of $6.65 million, each partner realized savings of more than $1 million by building a single facility to perform a double role.

Finally, the "New Schools for New York" Sunset Park design study project explored the feasibility of replacing an existing, inadequate library and some adjacent commercial structures with a larger library and a school. One entry proposed a joint-occupancy solution, opening the library to the community after school hours; another dual-use proposal would configure the space of the library itself to allow simultaneous school and community use.

Realistically, capital funding for a new facility from the Brooklyn Public Library (BPL) is unlikely in the current tight fiscal environment. Nonetheless, the study presents innovative ways in which significant duplication of facilities can be avoided by opening up the library to the public under carefully conceived guidelines. Thoughtful architectural solutions can be found to answer any questions of access, security, and circulation patterns in this highly cost-effective dual use.

VII. SAVINGS Through INTEGRATION with OTHER DEVELOPMENT

Unless there are currently underutilized schools in a district, new housing brings a need for new school seats. But in most cases, neither the planning nor building of schools is synchronized with housing construction in New York City.[32] Bronx Borough President Fernando Ferrer, for example, decried the "absence" of school planning in the housing developments located in his borough in the 1980s.[33] Similarly, proposed redevelopment of Hunter's Point on the Queens waterfront calls for 6,385 new apartments, yet its plans do not include a single school.[34]

Integrating schools with housing or commercial space offers large potential savings. Construction costs are reduced, because many costs in both capital outlays and time -- like site selection and acquisition, surveying, architects' fees and other professional services, and EIS and ULURP review -- are one-time charges. And synchronization of new school construction with housing development eliminates the need for costly expedients such as busing students to other districts, leasing space, or building annexes.[35] More savings are possible when the same contractors can be used for schools and housing. To the extent that the private sector can be induced through incentives to take a greater role in school construction, its efficiency and flexibility can be "borrowed" by school authorities to save time and money.

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[32] One notable exception is Queens' Arverne housing, incorporating two schools in a new oceanside development.

[33] January, 1990 teleconference.

[34] The City Planning Commission has recommended a small school be added.

[35] Even expedients such as these are preferable to the stopgap measures which now occur all too frequently, like classes held in a gym, or hallway reading groups for "overflow" students.

A. Specific Opportunities for Savings in Public Undertakings.

In the past, several independent public authorities in New York City have combined schools with new housing or commercial facilities. The Educational Construction Fund (ECF) built fourteen schools from 1973 to 1989, most in high-rise apartment buildings completed in the 1970s.[36]

Though some ECF projects show a deficit when considered in isolation, the program as a whole is in the black because of the sale of air rights above several school locations, tax equivalency lease payments from non-school portions, and low cost tax-exempt bonds. The ECF provided permanent financing for these fourteen schools through a $134 million bond issue.

And, though the Roosevelt Island Operating Corp (RIOC) provides a widely criticized example of coordinated housing and school construction, it should not be allowed to unfairly prejudice the case for small schools. The state-funded Urban Development Corporation (UDC) included five mini-schools in the first phase of RIOC's Northtown Development Project. The schools opened in synchrony with the completion of the housing. In this case, however, the five mini-schools were intended as a temporary measure until a single, larger school could be completed. Logistical questions of how the five schools would work were not adequately addressed.

B. Specific Opportunities for Savings in Private Development.

While the SCA may have mitigated the problems of delays and disputes endemic to school construction, it is still worthwhile to explore possibilities for private development of school buildings. In private development, construction efficiency has a direct impact on the bottom line. Private developers face the pressures of competition.

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[36] Perhaps the best known of these is the 1972 400-unit Highbridge House development, which includes the 1,100-seat PS 126; ECF also built Norman Thomas High School on the ground floor of a commercial office tower.

For an example of two very different and differently funded schools incorporated into a housing complex, consider Manhattan Community College and the original PS 234 (now a BOE early childhood center), constructed in the 1970s as part of Lower Manhattan's low- to middle-income Independence Plaza.

In private development, time is money subtracted from profit. The expense of additional interest payments on loans, additional tax payments prior to completion, and additional labor costs for avoidable work delays cut directly into profits. The increased costs associated with public-sector delays, however, have minimal consequences for public-sector developers.[37]

Private developers further have the strength of ongoing, trusting relationships with their contractors, because contracts are negotiated to serve the interests of both parties and can be terminated for cause. There is little incentive to exploit loopholes for any contractor who hopes to do business with the developer again. In contrast, at least before the SCA, many BOE contractors had become specialists in exploiting contract loopholes, because the public bidding process gave no preference to firms which had worked conscientiously in the past.

It would be timely to explore the comparative efficiencies of New York City's private sector and the SCA.

The private sector's flexibility in employing non-union labor could work in favor of more efficient school construction even though prevailing wages would be paid.[38] Union work rules limit what craftsmen can do, how they can do it and when.

Once a developer agreed to incorporate a school in its package, the developer's initiative and political muscle would be committed to pushing the project along. Advocacy would be on the shoulders of their staff, representing a saving of staff effort on the part of the public agency.

Precedent in Prison Construction. In a "turnkey" operation, a developer would build a school not as a general contractor of the SCA, nor as a contractor to the construction manager of the SCA, but as a private venture, and then sell or lease it to the Board of Education. There is precedent for this in prison construction. The legislatures of more than two dozen states have turned over the

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[37] In public construction, the effects of delays are mitigated because money is borrowed only as the need for it is projected; nonetheless, direct costs (inflation, wage increases, etc.) do go up with time.

[38] Prevailing wage rates must be paid if state or Federal money is involved (per Ford, Bacon, Davis Act).

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task of constructing new prisons (and in many cases, operating them as well) to the private sector. Given the enormous task of constructing more than thirty-five schools in the next ten years, it would be timely for New York City to explore the comparative efficiencies of the private sector and the SCA.

C. Incentives for Integration with Private Development.

Private developers are in business to make a profit. Innovation is the key to making school construction a potentially profitable venture. Incentives can be negotiated case by case, ranging from tax breaks and zoning modifications to sale of air rights. In addition, the existence of a new school in itself makes housing more marketable and provides stability to the surrounding neighborhoods. Although this benefit is not as easily quantifiable as tax breaks, it is indeed tangible, as any real estate broker knows.

- One innovative arrangement was undertaken by the South Commons Branch of Drake Elementary School in Chicago, Illinois[39]. In a complex exchange of costs and development benefits, a private developer purchased thirty acres of urban-renewal land and built housing, a shopping center, a church, a school, and community facilities. He gained favorable financing terms for the community building in which the church and school were located, in return for dedicating a share of profits from the shopping complex to maintenance of the community building. The school authorities paid considerably less than market rates to rent the school space, saving almost 40% and eliminating the need to undertake public construction.

- Lance West of Charles H. Greenthal Realty, a contractor involved with renovation programs in New York City, suggested that when a group of formerly city-owned tenements is to be renovated, the terms could require the developer to convert one building into a school for lease or sale to the Board of Education. The other buildings would be more marketable because of the nearby school, like a mini-magnet school, while the incremental cost of renovating one building out of a group would be less than that of renovating it alone or building

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[39] per above, "The President's Commission on School Finance Report," prepared by Cresap, McCormick, and Paget, International, 1971.

anew.

One interviewee objected that developers would not want to get involved for a single building, given that they would have to contend with the Board of Education's bureaucracy and the special requirements for schools. But the force of this criticism depends on how the deal is structured. For example, a task force might locate a site where housing renovation is going on, and get an idea of renovation costs on a square foot basis. Then they would ask the question, Is the developer going to make a reasonable rate of return on a 99-year lease? The Board of Education could achieve the same ends in new construction as well; it could locate a site where housing was proposed, work for a design which included a school, and thereby take control of square foot costs.

Alternatively, the city could offer better financing terms, tax breaks, zoning modifications, or other incentives to the developer in exchange for a reduced purchase price for the school. A price which permits the developer to break even or earn a small profit, but which limits that profit, would likely still be less than the cost for which the SCA could build the school.

- During his tenure in Florida, New York Schools Chancellor Joseph A. Fernandez successfully placed schools on premises where the students' parents work -- thus increasing the attractiveness of jobs there to working parents, and the attractiveness of the idea to their employer. Satellite schools were built in an airport to serve the children of the airport employees, in space donated by a college, and in an insurance company's building where separate space was designated for the school.

> **Combining schools with premises where the students' parents work increases the attractiveness of jobs there to working parents, and thus the attractiveness of the idea to their employer.**

- In our "New Schools for New York" design study project on a Flushing site, a 200-seat junior high school was slotted into two floors of a proposed office building. It was envisioned that the developer would donate the space in the building, while the Board would pay to maintain it. (Alternatively,

perhaps one or a group of companies might turn over the space.) Such a setting can do much to integrate a school and its students into the working world "outside." The need for specific job-related skills and for good work habits, for example, is likely to be more real to students in a situation like this.

The economics of this particular program at this particular site were not costed out at the time of publication, since it ultimately hinged on finding a commercial tenant interested in the exchange of space for school use. And presumably, the attraction of a nearby school to working parents is greatest for the lower grades. However, we believe that this site is potentially cost-effective.

- New York University has eleven years' experience with a satellite location of twenty classrooms on two floors of a high-rise office building in midtown Manhattan. When seeking expansion space, the university concluded that it was more economical to renovate and lease space in a commercial office building than to build anew.[40]

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[40] Lillian Zaita, the Director of the NYU Midtown Center, explained that while the terms of the lease are somewhat more favorable than otherwise because the building owner is also a member of the Board of Trustees of the School, they are not too far from market rates.

VIII. CONCLUSIONS AND RECOMMENDATIONS

Recent research demonstrates that in urban settings, and especially in disadvantaged school districts, limiting the size of schools is the first step in improving public education. We believe that this research is too crucial to ignore, and that the educational costs of the large-school status quo are too great. Parents, communities and their representatives must demand that public school systems create smaller schools.

For too long, that central goal has taken second place to what were considered "practical" considerations of economies of scale. But, if they exist at all, the economies of scale in school construction that have dominated the New York City Board of Education's planning are largely a function of hidebound thinking and traditional practice. Our investigation shows that there are countervailing economies in a flexible, adaptive approach to school planning, siting, and organization.

We can move to smaller schools if we change prevailing school construction strategies. It is not necessary to scrap existing plants. Small schools can be housed in large buildings. But it is largely unnecessary, and certainly inconsistent with current insights about urban education, to continue building new, giant buildings dedicated to schools. If we do have to construct such buildings, they should be subdivided.

Moreover, we can redo some of our existing structures. It is irrational to pursue the current substantial building modernization program without taking advantage of the opportunity to reorganize the interiors of old, large buildings to better accommodate small school subunits.

With these premises in mind, we recommend that the Board of Education and School Construction Authority develop an updated school planning and construction strategy with the following key elements:

- New school buildings should be small or should house schools and other facilities together. If population density or site limitations in crowded neighborhoods absolutely require concentration of many students at one site, the buildings should be divided into schools-within-schools.

- New small schools should be planned and built in conjunction with new community development. In this way, savings can be realized from incremental expansion to meet population needs; coordination of public and private development; rehabilitation or reuse of materials; and multiple use of infrastructure, foundations and the buildings themselves.

- Planning for new schools in densely populated communities should fully explore the potential for obtaining small sites at advantageous cost and/or renovating existing small buildings for school use.

- School modernization plans should be revised to include interior reorganization into subschools.

- Modular school designs for pending new large school construction should be reappraised and modified, if necessary, to convert modules into autonomous sub-school units.

- Planning for new schools should be coordinated with planning for other new social service facilities -- e.g., vocational training, recreation, health, early childhood sites, etc. -- that can appropriately be housed in school/community centers.

A commitment to the flexible strategy we advocate can best be accomplished by beginning with community input, tailoring the core design to complement or employ, rather than duplicate, a neighborhood's existing amenities. For example, the City Planning Commission, the Department of Housing Preservation and Development and the Board of Education should work together with community boards and school boards in identification of school sites. Many agencies will have to cooperate in creation of multi-use facilities housing health, recreation, daycare, library and other services as well as schools.

Such collaborations, vigorously pursued, offer new possibilities for savings, more productive and effective use of each agency's efforts, and schools that are capable of serving our children better. ■

Appendix A

An Elaboration on the 1964 Barker, Gump Studies[1], examining the correlation between institutional size and academic achievement.

Striking aspects of the negative relationship between institutional size, individual participation and academic achievement were confirmed as early as 1964 in Roger Barker's groundbreaking report, Big School, Small School: High School Size and Student Behavior.[1] While studying a sample of high schools with enrollments from 35 to 2,287 students, the author found that the attendance and participation in voluntary activities by students in small schools were much higher than that of their counterparts in large settings. There were fewer "outsiders" in smaller schools. And, almost by definition, there were more important and responsible positions for students in the extra-curricular settings.[2] The fact that responsible positions were more numerous in relation to the smaller pool of students was proven to more than compensate for the greater resources and facilities of larger schools.

The studies of Barker, Gump, et al demonstrated that the larger the school, the less students feel themselves integral to the setting; the less the teachers know each pupil by sight, whether or not they teach that individual child; the less the children are induced to assume positive, responsible behavior because they feel "accountable" to familiar adults. To speak in concrete terms, the less would be the need for a particular child to fill a role in the junior class play, or to run for a student council position, or give an oral report on a book from the senior English class reading list. And, they conclude, the less would be the motivation for a child to "show" his or her peers and mentors that s/he can develop competence, since the satisfactions and accomplishments associated with successful learning cause barely a ripple of recognition among

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[1] See Roger G. Barker with Paul V. Gump et al, in Bibliography (attached), University of Kansas, 1962; Stanford University Press, 1964.

[2] Responsible positions, the researchers found, presented much greater potential for a student to derive personal satisfaction from being challenged, to engage in important actions, and to be involved in group activity. In other words, small schools gave more meaningful experiences to their students.

either peers or mentors when an educational setting has overwhelming parameters.

Attendance and participation closely parallel and stimulate motivation and involvement; Barker and Gump went on to show that small-school students benefited in many hard-to-measure ways, all of which are crucial to academic achievement. Children in small schools were more involved, and they experienced greater pressures to act responsibly. The extent of this greater involvement is astonishing: the proportion of students who actively participated in extracurricular activities was 20 times as great in small schools as in large. And while their work did not attempt to assess participation and motivation in class, common sense would strongly suggest that such an increase in school spirit and vitality would carry over into the classroom.

Furthermore, viewed on a larger scale, smaller schools did a better job of promoting the shared goals of citizenship which school should properly encourage in our youngsters.

Barker and Gump concluded that if educators wished to create good schools, they needed to create settings consonant with their educational goals, i.e., smaller schools. By positively influencing the level of student participation, motivation, attitudes toward taking on responsibilities, and the pupils' involvement over time, small schools can better provide the kind of environment where learning can take place.

--- Diane Dolinsky, 1990

Appendix B

Additional Findings from "Examining the Effects of Intra-District Variation on School Size and Resources"[1]

A recent study by the Chicago Panel on Public School Policy and Finance, cited in the opening paragraphs of this report, divided its 343-school sample by racial composition as well. It found that in three of the four different racial classifications of schools, school size was "tremendously" important in relation to achievement.

Significantly, "segregated schools," which happen to have the largest average school size of all classifications, showed the strongest correlation. In segregated schools, where the white students made up between 1% and 29% of the population, the correlation between achievement and school size was almost as large as the correlation between achievement and percent of impoverished students.[2]

In magnet schools with expanded resources and/or innovative curricula, which whites were disproportionately more likely to attend, regressions show that school size was the greatest predictor of achievement compared to other variables.

In the third classification, desegregated schools, school size once again became the second most important factor after socio-economic levels.

In the sole classification where this finding did not apply to a comparable extent, those racially isolated schools having no white enrollment whatsoever, the pupil-teacher ratio became the new factor to emerge as significant[3].

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[1] See Bibliography for Hess and Corsino, Chicago Panel on Public School Policy and Finance.

[2] These correlation coefficients were -.43 and -.56 respectively.

[3] It must also be noted that in this classification, the percentage of students living in poverty was the highest among all four classifications.

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These findings in a single district were confirmed in a subsequent study by Fowler and Walberg (see Bibliography) on a statewide, interdistrict basis.

Appendix C:

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* INDICATES TITLE RELATED TO SMALL SCHOOLS

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